

WHAT IS CLAIMED:

1. A polarization controller comprising:
 - a first element having a first optical axis and configured to receive light having a first phase;
 - a second element having a second optical axis and configured to emit the light having a second phase;
 - a third element having a third optical axis where at least a portion of the third element is interstitial to the first element and the second element; and
 - a first driver coupled to the first and the second element to reset the third element.
2. The polarization controller of claim 1 further comprising a second driver coupled to the third element.
3. The polarization controller of claim 1 wherein the first and the second elements are half-wave plates and the third element is a full-wave plate.
4. The polarization controller of claim 1 wherein the third optical axis is about 45 degrees from the first and the second optical axes.
5. The polarization controller of claim 4 wherein the first and the second optical axes are substantially the same.
6. The polarization controller of claim 4 wherein the first and the second optical axes differ by about 90 degrees.
7. The polarization controller of claim 2 wherein the first driver is configured as a switch to generate a first control signal having both an off-state and an on-state of operation and the second driver is configured to generate a second control signal having a variable state of operation.
8. The polarization controller of claim 2 wherein the first driver and the second driver generate a first control signal and a second control signal, respectively.

9. The polarization controller of claim 8 further comprising a drive-control module configured to cause the second driver to generate the second control signal having
- a first characteristic
 - if a direction of the phase is determined to be increasing and
 - if a magnitude of the first phase is associated with a first subset of phase angles,
 - the drive-control module configured further to cause the second driver to generate the second control signal having
 - a second characteristic
 - if the direction of the phase is determined to be increasing and
 - if the magnitude of the first phase is associated with a second subset of phase angles.
10. The polarization controller of claim 9 further comprising a phase-characterizing module configured to determine the direction of the first phase and the magnitude of the first phase.
11. The polarization controller of claim 9 further comprising a drive-limiting module configured to change the first characteristic of the second control signal to the second characteristic of the second control signal about when the magnitude of the first phase changes from the first subset to the second subset of phase angles.
12. The polarization controller of claim 9 further comprising a resetting module configured to cause the first driver to switch from generating a first state of the first control signal to generating a second state of the first control signal about when the magnitude of the first phase changes from the first subset to the second subset of phase angles.
13. The polarization controller of claim 12 wherein the first state is an activation state and the second state is a deactivation state.

14. The polarization controller of claim 9 wherein the first subset of phase angles includes angles from about 0π to about 2π .
15. The polarization controller of claim 11 wherein the second control signal is a variable voltage and the first characteristic is a decreasing magnitude.
16. The polarization controller of claim 9 wherein the second control signal is a variable voltage and the second characteristic is an increasing magnitude.
17. The polarization controller of claim 16 wherein the second subset of phase angles includes angles from about 2π to about 4π .
18. The polarization controller of claim 8 wherein the polarization further comprises:
a fourth element having a fourth optical axis where at least a portion of the fourth element is interstitial to the first element and the third element;
a fifth element having a fifth optical axis where at least a portion of the fifth element is interstitial to the third element and the second element; and
a third driver coupled to the fourth and the fifth elements,
wherein the first driver is configured to reset the fourth and the fifth elements.
19. The polarization controller of claim 18 wherein the first, the second, the fourth, and the fifth elements are half-wave plates and the third element is a full-wave plate.
20. The polarization controller of claim 19 wherein the fourth optical axis and the fifth optical axis are orientated about 45 degrees in relation to the third optical axis.
21. The polarization controller of claim 19 wherein the first and the second optical axes differ by about 90 degrees.
22. The polarization controller of claim 18 wherein the polarization controller further comprises:

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a sixth element having a sixth optical axis where at least a portion of the sixth element is interstitial to the first and the fourth elements;

a seventh element having a seventh optical axis where at least a portion of the seventh element is interstitial to the fifth and the second elements; and

a fourth driver coupled to the sixth and the seventh elements,

wherein the first driver and the third driver are the same driver and operate unitarily to activate and to deactivate the first, the second, the fourth, and the fifth elements, wherein the first and the second elements are configured to reset the sixth and the seventh elements and the fourth and the fifth elements are configured to reset the third element.

23. The polarization controller of claim 18 wherein the first, the second, the fourth, the fifth element, the sixth and the seventh elements are half-wave plates and the third element is a full-wave plate.

24. The polarization controller of claim 18 wherein the fourth optical axis and the fifth optical axis are orientated about 45 degrees from the third optical axis, the first and the second optical axes differ by about 90 degrees, and the sixth optical axis and the seventh optical axis are orientated about 90 degrees from the third optical axis.

25. A polarization controller comprising:

a first element having a first optical axis and configured to receive light having a first phase;

a second element having a second optical axis and configured to emit the light having a second phase;

a third element comprising at least four subelements configured to operate as a rotator, where at least a portion of the third element is interstitial to the first element and the second element;

a first driver coupled to the first and the second element to reset the third element; and

a second driver coupled to the third element.

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26. The polarization controller of claim 25, wherein each of the at least four subelements is a twisted nematic liquid crystal cell.
27. The polarization controller of claim 25, wherein the first driver operates as a switch and the second driver operates an AC-voltage generator.
28. The polarization controller of claim 25, wherein each twisted nematic liquid crystal cell has a twist angle of about 135 degrees.
29. The polarization controller of claim 25, wherein the at least four subelements includes a first subelement having a first optical axis, a second subelement having a second optical axis, a third subelement having a third optical axis, and a fourth subelement having a fourth optical axis, where the first optical axis is aligned about 90 degrees to the second optical axis, the second optical axis is aligned about 90 degrees to the third optical axis, and the third optical axis is aligned about 90 degrees to the fourth optical axis.
30. The polarization controller of claim 25 further comprising:
a fourth element having a fourth optical axis and configured to receive the light having a third phase;
a fifth element having a fifth optical axis and configured to emit the light having the first phase;
a sixth element having a sixth optical axis where at least a portion of the sixth element is interstitial to the fourth element and the fifth element; and
a third driver coupled to the fourth and the fifth element to reset the sixth elements.
31. The polarization controller of claim 30 wherein the first, the second, the fourth, and the fifth elements are half-wave plates and the third and the sixth elements are full-wave plates.
32. The polarization controller of claim 31 wherein the first and the second optical axes differ by 90 degrees and the fourth and the fifth optical axis differ by 90 degrees.
33. The polarization controller of claim 25, wherein polarization controller further comprises:



a fourth element having a fourth optical axis and configured to receive light having a third phase;

a fifth element having a fifth optical axis and configured to emit the light having the first phase, where at least a portion of the fifth element is interstitial to the fourth element and the first element;

a sixth element having a sixth optical axis configured to emit the light having a fourth phase;

a seventh element having a seventh optical axis and configured to receive the light having the second phase, where at least a portion of the seventh element is interstitial to the second element and the sixth element; and

a third driver coupled to the fourth and the sixth elements to reset the fifth and the seventh elements,

wherein the third driver operates as a switch.

34. The polarization controller of claim 33 wherein the fifth and the seventh elements are half-wave plates.

35. The polarization controller of claim 33 wherein the fourth and the sixth elements each comprise 90-degree twisted nematic cells.

36. The polarization controller of claim 25 further comprises:

a fourth element having a fourth optical axis and configured to receive light having a third phase;

a fifth element having a fifth optical axis and configured to emit the light having the first phase, where at least a portion of the fifth element is interstitial to the fourth element and the first element;

a sixth element having a sixth optical axis configured to emit the light having a fourth phase;

a seventh element having a seventh optical axis and configured to receive the light having the second phase, where at least a portion of the seventh element is interstitial to the second element and the seventh element; and

a third driver coupled to the fourth and the sixth elements to reset the fifth and the seventh elements, wherein the third driver operates as a switch.

37. The polarization controller of claim 36 wherein the fifth and the seventh elements are 90-degree rotators comprising twisted nematic cells.

38. The polarization controller of claim 36 wherein the first, second, fourth and the sixth elements are each half-wave plates and the third element is a full-wave plate.

39. A method for resetting a polarization controller comprising:
determining that the phase magnitude is associated with a first range of phase angles,
and

generating a first control signal having a first characteristic if the phase magnitude is increasing, and

generating the first control signal having a second characteristic if the phase magnitude is decreasing; and

determining that the phase magnitude is associated with a second range of phase angles, and

generating the first control signal having the second characteristic if the phase magnitude is increasing, and

generating the first control signal having the first characteristic if the phase magnitude is decreasing.

40. The method of claim 39 further comprising determining whether a phase magnitude of a beam of light is increasing or decreasing.

41. The method of claim 39 wherein the first characteristic and the second characteristic are a decreasing and an increasing magnitude, respectively, of the first control signal.

42. The method of claim 39 further comprising applying the first control signal to a variable wave-plate.

43. The method of claim 39 further comprising:
generating a second control signal having a first state if the phase magnitude is associated with a first range of phase angles; and
generating the second control signal having a second state if the phase magnitude is associated with a second range of phase angles.
44. The method of claim 39 further comprising applying the second control signal to at least two half-wave plates.
45. The method of claim 43 wherein the first state is an on-state and the second state is an off-state.
46. An apparatus for resetting a polarization controller comprising:
means for determining that the phase magnitude is associated with a first range of phase angles, and
generating a first control signal having a first characteristic if the phase magnitude is increasing, and
generating the first control signal having a second characteristic if the phase magnitude is decreasing; and
means for determining that the phase magnitude is associated with a second range of phase angles, and
generating the first control signal having the second characteristic if the phase magnitude is increasing, and
generating the first control signal having the first characteristic if the phase magnitude is decreasing.
47. The apparatus of claim 46 further comprising means for determining whether a phase magnitude of a beam of light is increasing or decreasing.
48. The apparatus of claim 46 wherein the first characteristic and the second characteristic are a decreasing and an increasing magnitude, respectively, of the first control signal.

49. The apparatus of claim 46 further comprising means for applying the first control signal to a variable wave-plate.

50. The apparatus of claim 46 further comprising:
means for generating a second control signal having a first state if the phase magnitude is associated with a first range of phase angles; and
means for generating the second control signal having a second state if the phase magnitude is associated with a second range of phase angles.

51. The apparatus of claim 50 further comprising means for applying the second control signal to at least two half-wave plates.

52. The apparatus of claim 50 wherein the first state is an on-state and the second state is an off-state.